

Characterization of Siliceous Sinter From Pong Duet Pa Pae Hot Spring : an Analogue to Early Earth and Mars Environments

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Siliceous sinter from several terrestrial hot springs have been identified as analogues to nearly pure opaline silica deposits, which were discovered at Columbia Hills, Mars by the rover 'Spirit'. On Earth, mineralized microbes and silica conjointly accumulate and build up over time to produce microstromatolites, analogue to predominant structures in early Earth paleoenvironments. Here we collected siliceous sinter and silicified microbial mats from Pong Duet Pa Pae, an alkali, mid-to-high temperature hot spring in northern Thailand, and identified the morphological, mineralogical and biological characterizations. SEM results revealed different levels of microbial silicification within the sinter. Mineralogy of the sinter, examined using X-ray Diffraction (XRD), energy dispersive spectroscopy (EDS) and Fourier-transform infrared spectroscopy (FTIR) techniques, which confirmed the presence of amorphous silica (Opal-A), showed to be closely resemble Martian-analogue siliceous sinter from other terrestrial hot springs, such as Yellowstone National Park (USA) and El Tatio (Chile). This study is a pilot work on investigating species of extremophiles in terrestrial siliceous hot springs, including the process of silicification which could provide better understandings of biosignature preservation and narrow down possible candidates for the Mars 2020's seeking sign of past life mission.

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